SYSTEM AND METHOD FOR DESIGNATION PROCESS INFORMATION

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

5   The present invention relates to an information designation system which designates process control, and which is applicable to a wide variety of process control mainly in a flexible manufacturing line in a manufacturing factory, and a method for designating the process control
10   in said system.

DESCRIPTION OF RELATED ARTS

Here, a printing process in packing and shipping lines for cosmetic containers or food containers will be
15   exemplified and described as a typical flexible manufacturing line. In the packing and shipping lines for cosmetic containers or food containers, a prescribed number of the packed products are encased in a unit box (small box), and a prescribed number of the unit boxes are encased
20   in a transporting box (large box), which will be shipped. The unit box and the transporting box in which the products are encased are subjected to prescribed printing including a packing ID, a lot number, and/or name of manufacturer. As just mentioned, since the printing process is executed
25   subsequent to the packing process or encasing process of the products, a plurality of printing presses (printers)

are distributed near the packing machine(s) and the encasing machine(s). Each of the printers individually carries out printing process based on a prescribed printing mode which defines designed letters and patterned images to be printed, printing positions, sizes, colors thereof and the like.

In the case of the process control of the printers installed in a distributed manner, there is a possibility that setting error will occur if the control data which defines the printing mode is set for a control apparatus which controls the actuation of respective printers. For this reason, a system has hitherto been constructed in which a server system unifying respective apparatuses is installed in the system and the control data to control respective control apparatuses is set all at once from the server.

However, in the case of the products such as the cosmetic containers and the food containers manufactured in the flexible manufacturing lines, new kinds of products will be often added within a relatively short period of time. Also, in such a case, due to shipping control such as increasing of the products, printers and/or control units are often added. When the set conditions in the printing process are modified or the equipments are added, various settings in the server system should be modified according to the change in the conditions etc. These

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modifications involve for example rewriting of the designation program for controlling the printing mode, resetting of numbers for identifying the products and the printing mode for the kinds of the products, leading to the problems in terms of complicated handling, increased man-hours, and expense costs.

SUMMARY OF THE INVENTION

The present invention has been made to solve the above problems and an object of the present invention is to provide a system and a method for designation process information excelling in extensibility which can easily deal with modifications of the setting conditions and addition of the equipments as in the printing process in the flexible manufacturing process.

According to the present invention which can attain the object described above, there is provided a system for designation process information comprising:

a process execution apparatus for executing a given process,

a process control apparatus which executes a prescribed process control of said a process execution apparatus; and

a process designation apparatus which designates the process control of said process control apparatus. The process designation apparatus possesses a designation

information list for the process control, and said process control apparatus possesses a control mode table including a control mode which defines the actuation of the process designation apparatus; an information reader which reads the designation information from said designation information list, and a process controller which acquires a prescribed control mode from said control mode table to perform the process control of said process execution apparatus.

In the system for designation process information, the process control apparatus reads the designation information represented from the process designation apparatus, and based on the read information, a prescribed process control is performed. Specifically, the process designation apparatus only possesses process designation information including a series of information concerning specification of the subjects to perform a specific work, e.g., designation information such as kind of product, derivation, and lot number, and does not possess a series of information concerning the actuation of the process execution apparatus. The process control apparatus has the control mode table containing the control modes each defining the actuation of each of process execution apparatuses individually. The process execution apparatus makes a query for the designation information to the process designation apparatus at a prescribed timing, reads

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the control mode corresponding to the represented designation information from the control mode table, and controls the process execution apparatus according to the read control mode.

In the present invention, since the process control is carried out as described above, in the case where the modification of the setting conditions for performing the process control or the addition of the process execution apparatus(es) will be made, it is not required for the process designation apparatus to modify how to represent the designation information, but it is only required to set a control mode. The division of information for the process control into the designation information indicating the kind of products and the control mode table indicating the control mode and the distribution of them to separate apparatuses makes it possible to deal with the extension of the system in an easy manner. It is noted that in the process control, the process control table is not referred one after another, but is referred only in the case where the designation information is different from the information of the prior opening, the system judges that the control mode is shifted to the next control mode, at which the process control apparatus refers the process control table and switches the control mode to the next control mode.

There is also provided a method for designating

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process control in a system for designation process information comprising: a process execution apparatus for executing a given process, a process control apparatus which executes a prescribed process control of said a process execution apparatus; and a process designation apparatus which designates the process control of said process control apparatus, said process designation apparatus possessing a designation information list for the process control, said process control apparatus possessing a control mode table including a control mode which defines the actuation of the process designation apparatus, an information reader which reads the designation information from said designation information list, and a process controller which acquires a prescribed control mode from said control mode table to perform the process control of said process execution apparatus, the method .comprising the following steps:

a) a step in which said control apparatus performs a prescribed process control at the presently acquired process control mode;

b) a step in which the step a) is continued until said process execution apparatus completes said prescribed process;

c) a step in which after the process execution has been completed, said process control apparatus makes a query for the designation information to said process

designation apparatus;

d)   a step in which, upon receiving the query for the designation information, said process designation apparatus reads the designation information from the designation information table and represents said designation information utilizing a response signal to said process control apparatus,

e)   a step in which said process control apparatus judged whether or not the control mode is switched to the next mode; and

f)   a step in which if said process control apparatus judged to switch the control mode into the next control mode, said process control apparatus acquires a prescribed control mode from the control mode table and initiate said acquired control.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an explanatory drawing which totally explains the printing process in the packing and shipping lines for cosmetic container, food container or such.

Fig. 2 is a block diagram showing the configuration of the information designation system of the present system.

Fig. 3 is a block diagram showing the functional configuration of the information designation system of the present system.

Fig. 4 shows one example of a list of the designation

information.

Fig. 5 sows one example of the represented designation information.

Fig. 6 shows one example of the control mode table.

Fig. 7 is a flowchart showing the operation of the information designation system according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The information designation system according to the present invention will now be described.

The present invention concerns a system for designation process information mainly comprising a process execution apparatus for executing a given process, a process control apparatus which executes a prescribed process control of said a process execution apparatus; and a process designation apparatus which designates the process control of said process control apparatus.

The process execution apparatus(es) to be used in the present invention may be one or more and they are not specifically restricted as long as they perform a prescribed process corresponding to a process control signal from the process control apparatus. Each of them is appropriately selected depending upon the objects. For example, for a process execution in which letters are printed on a carbon copy type continuous form, a dot matrix

printer may be selected. For example, for a process execution in which a color printing is performed, a color laser beam printer or an inkjet printer or a combination thereof can be selected. The process execution apparatus possesses an interface for receiving a process control signal from the process control apparatus. These process execution apparatuses are freely selected in the objected lines and they may be the same or different.

The process control apparatus in the present invention are not specifically restricted as long as they has a hardware configuration, which will be described fully later on, and upon receiving process control designation from the process designation apparatus, which will be described below, they send a signal for the process control of the corresponding process execution apparatus. An example includes a computer system. The process control apparatus used in the system of the present invention may be one or more as occasion demands. The process control apparatus has an interface for exchanging the signal (information) to the process execution apparatus and the process designation apparatus. In a specific embodiment, the process control apparatus may be accommodated within the process execution apparatus.

The process designation apparatus is an apparatus making a process information designation by any of the known methods, and an example thereof is a server. The

process designation apparatus is connected to the process control apparatus, e.g., via a local area network (wire or wireless). By communication through the known protocol, the process designation apparatus can make a process

5　control designation to the process control apparatus. Each of the process control apparatus(es) and the process designation apparatus(es) has communication means such as a modem, a terminal adaptor, or a router. They can be or are always connected via any of various lines such as switched

10　lines, ISDN lines, and leased lines.

Consequently, the present invention is not restricted to how to send and receive data.

In the following embodiments, the system of the present invention will be described utilizing the printing

15　process in packing and shipping lines for cosmetic containers or food containers as a typical example. However, it should be noted that the present invention should be not restricted to such a printing process.

Fig. 1 is an explanatory drawing which totally

20　explains the printing process in the packing and shipping lines for cosmetic container, food container or such. In this figure, references 40a, 40b, and 40c each stands for a printer such as an inkjet printer (process execution apparatus), 30a, 30b, and 30c each for a process control

25　apparatus, which executes a prescribed printing control of each of the printer 40a, 40b, and 40c, and 20 for a process

designation apparatus which represents designation information concerning the process control of the process control apparatuses 30a, 30b, and 30c.

In the packing and shipping lines, first containers 1 which had been packed with a warping film are subjected to prescribed printing by means of the printer 40a to prepare printed containers 2. The printed containers 2 are encased in a unit box 3 at a prescribed unit such as ten, and the unit box 3 is subjected to a prescribed printing by means of the printer 40b to prepare a printed unit box 4. The printed unit boxes 4 are further encased in a transporting box 5 at a prescribed unit such as 10. The transporting box 5 having been printed is closed, sealed, and then are subjected to a prescribed printing by means of the printer 40c to prepare a printed transporting box 6. The printed transporting boxes 6 are aligned and piled up to be ready for shipping.

Next, referring to Fig. 2, the configuration of the process information designation system according to the present invention will be described. In the drawing of Fig. 2, between the process designation apparatus 20 and each of the process control apparatuses 30a, 30b, and 30c, is connected a communication line 60. The communication line 60 may be cable lines, wireless lines or combination thereof. An information registration apparatus 50 is an apparatus for intensively performing the registration of

the designation information in the process designation apparatus 20 and the registration of the control mode in the process control apparatus 30 at one portion. The operations of the printers 40a, 40b, and 40c, which are the

5   process execution apparatuses, are controlled by means of the process control units 30a, 30b, and 30c, respectively.

[Process Designation Apparatus]

Next, referring to Fig. 3, the process designation

10 apparatus 20 will be described. In this figure, the process designation apparatus 20 is composed of a designation information list 21 which stores the designation information for the process control apparatus 30, and a registrar 22 (registering means) which registers

15 the designation information. Optionally, a monitor 23 for monitoring the operation condition of the printer 40 may be included in the process designation apparatus 20.

The designation information list 21 is a list for a series of designation information required for acquiring

20 the control mode by the process control apparatus 30. Fig. 4 shows an example of the designation information list 21. In the example shown in this figure, designation information concerning product number (shown as Product No. in the figure), a lot number (shown as Lot No. in the

25 figure), a number of product (shown as No. in the figure), destination and the like is registered. The production

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number concerns a number for distinguishing the kind of the product to be dealt with the printing process. The lot number concerns a number which can identify the date and place of production, parts making up the product, and the like. The number of products concerns a prescribed number of the products to be printed given in a lot. The destination concerns information for the receiver and their address, the orderer, and the like. The designation information list 21 is stored in a prescribed address within a storage device (not shown) of the process designation apparatus 20 in a readable manner.

The registrar 22 is means for registering the designation information in the designation information list 21. The designation information including the product number, lot number, number of the products, destination and the like is registered via the registrar 22 as occasion demands. In the case where a new handling product is added, the production number thereof is newly added. The registration of the designation information is performed via an inputting device (not shown) of the process designation apparatus 20. Taking into the consideration of the security, it is possible that only a predetermined operator can operate this operation. In this case, the user authorization of the operator is performed as the process designation apparatus 20 requests for the operator to input an ID number and a password. Also, as shown in

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Fig. 2, the information registration apparatus 50 can be disposed to jointly perform this operation and the registration of the control mode in the process control apparatus 30, which will be described later on.

5 The monitor 23 for monitoring the operation condition is means for monitoring the operating condition of the printer 40. The system depicted on Fig. 3 is configured that the operation condition of the printer 40 is acquired via the process control apparatus 30. Usually, the process

10 control apparatus 30 always catches the operating condition of the printer 40. It is more effective if the information for the operating condition of the printer 40 is received from the process control apparatus 30 rather than such information is directly acquired from the printer 40.

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[Process Control Apparatus]

Next, the process control apparatus 30 will be described referring to the functional block diagram of Fig. 3. In this figure, the process control apparatus 30 is

20 composed of a control mode table 31 including control modes, a registrar 32 for registering the control modes, a reader 33 for reading the designation information from the process designation apparatus 20, and a process controller 34, which acquires a prescribed control mode from the control

25 mode table 31 based on the designation information having been read to perform the process control of the printer 40.

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The process control apparatus 30 may also be configured to possess means for notifying the operating condition of the printer 40, which catches the operating condition for the printer 40 and notifies it to the process designation

5   apparatus 20.

The control mode table 31 is a table in which the control modes for executing the printing control of the printer 40 are registered. Fig. 6 shows an example of the control mode table. In the control mode table, the control

10 mode, which defines the printing data such as designed letters and patterned images, printing positions, sizes and colors, is registered per every product numbers. This control mode has been previously set so as to uniquely correspond to the product number represented from the

15 designation information. For example, a product number "A" corresponds to a control mode "a", and a product number "B" corresponds to a control mode "b". Although not shown in the figure, different control modes 31 are registered in the respective process control apparatuses 30, for the same

20 product number "A". For example, the control mode in one process control apparatus 30 is registered so as to print the packing ID number, whereas the control mode in another process control apparatus 30 is registered so as to print the lot number, respectively. The control mode table 31 is

25 stored in a prescribed address within the storage device (not shown) of the process control apparatus and can be

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read via the process controller 34.

The registrar 32 for the control mode is means for registering a prescribed control mode in the control mode table 31. By means of the registrar 32 for the control mode, the control mode for printing such as designed letters and patterned images to be printed in the printer 40, printing positions, sizes, colors thereof and the like is registered in advance. If a new handling product is added, the control mode corresponding to the product concerned is newly registered. It may also be configured that the registrar 32 for the control mode and the registrar 22 for registering the designation information described above are unified with each other. For example, as shown in Fig. 2, the information registration apparatus 50 can be disposed to jointly perform the registering operations. By such a configuration, the designation information which will be registered in the process designation apparatus 20 and the control mode which will be registered in the process control apparatus 30 can be registered in such a manner as to correctly and uniquely correspond to the product number represented in the designation information. In addition, in comparison with individual registrations in respective apparatuses, the registration can be performed effectively.

The reader 33 for reading the designation information makes a query for the designation information to the

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process designation apparatus 20, and reads out the designation information contained in the designation information list 21. The query for the designation information is, for example, automatically performed at a predetermined given timing. The timing of the query is decided considering such elements as the shipping amount of the handling products, and the operating time, and freely varies. For example, it can be set to make a query every given times, or to make a query every after the completion of the printing. Also, for the purpose of the maintenance and for precaution against unexpected trouble, it is preferable that a signal for query can be manually sent.

The process controller 34 is means for acquiring a prescribed control mode from the control mode table 31 based on the designation information and for executing the printing control based on the acquired control mode. The process controller 34 prepares printing data corresponding to the product number contained in the designation information and controls the printer 40 so as to make prescribed printing.

The device 35 for notifying the operating conditions is to notify the present operating condition, which are always caught, to the process designation apparatus 20 at a prescribed timing. For example, with regard to the notification of the present operating condition, the information of the operation condition may be included in

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the query signal for the designation information sent from the reader 33 for reading the designation information. In this case, it is also preferable for maintaining the monitoring of the operation of the total system in a matched state to notify the present operating condition to the process designation apparatus 20 if the operating condition of the printer 40 is changed.

[Configuration of Hardware]

The hardware configuration of the process designation apparatus 20 and that of the process control apparatus 30 will be described. Both the process designation apparatus 20 and the process control apparatus 30 may be composed of information process apparatuses such as personal computer systems. The information processing apparatus is composed of a control-processing unit which totally controls the whole of the apparatus having a storage device connected thereto. To the control-processing unit are connected inputting devices including a keyboard, a mouse, a scanner and the like and a display unit for use in monitoring the input/output data, output devices which outputs a wide variety of data, and a communication unit via an I/O controller.

The control-processing unit is composed of a central processing unit (CPU) and an internal memory, in which an operating system (OS) and any other programs for executing

various registrations and controls are developed. For example, in the process designation apparatus 20, there is a program for registering the designation information, and in the process control apparatus 30 there is a program for having the operating condition of the printer included in the designation information. Also, included in the process control apparatus 30 are a program for registering the control mode, a program for inquiring the designation information, a program for acquiring a prescribed control mode based on the read designation information to execute the printing control, a program for notifying the operation conditions of the printer 40 to the process designation apparatus 20, and the like.

The designation information list 21, the registrar 22 for registering the designation information, and a monitor 23 for the operating condition in the process designation apparatus 20, and the control mode table 31, the registrar 32 for registering the control mode, the reader 33 for reading the designation information and the device 35 for notifying the operating conditions in the process control apparatus 30 realize their functions respectively by means of the hardware configurations and the programs described above.

The storage device comprises a hard disk drive, a photo magnet disk or the like, and has the designation information list 21 and the control mode table 31

respectively prepared therein.

While the process designation apparatus 20 possesses a program for executing the printing control to the printer 40, this program is generally referred to as a sequence control program. Specifically, process designation apparatus 20 is composed of devices having an information processing function and a sequence control function.

[Operation]

Referring to Fig. 7, the operation of the information designation system according to the present invention will be described. In the flowchart depicted on Fig. 7, the process control apparatus 30 performs a prescribed printing control to the printer at the control mode now acquiring (Step 101). This printing control is continued until a prescribed number of prints have been completed (Step 102). After the completion of printing a prescribed number of prints, the process control apparatus 30 sends the notification of completion of the printing to the process designation apparatus 20 (Step 103).

When the prescribed printing has been finished, the process control apparatus 30 makes a query for the designation information to the process designation apparatus 20 (Step 104). The query may be repeatedly made even before the printing control for printing a prescribed number every prescribed period of times. Upon receiving

the query for the designation information, the process

designation apparatus 20 reads the designation information

from the designation information list 21, and represents

the read designation information to the process control

5   apparatus 30 using a response signal to the process control

apparatus 30 (Step 105).   At this time, it is possible to

provide a specific flag showing specific conditions for the

alternation, and to add the designation information to the

response signal when the flag is "ON".

10   Here, an example of representing the designation

information is shown in Fig. 5.   Fig. 5 exemplifies that

the product number, lot number, number (of the products),

and operation condition are included as the designation

information.   The reason why the lot number should be

15   represented is for the purpose of carrying out a lot

product in an ensured and effective manner.   Usually, a lot

production is applied in the case where many kinds of

products are continuously produced.   In relatively

inexpensive products such as cosmetic containers and food

20   containers, it is important for realizing packing and

shipping lines with a low cost to effectively switch one

lot into another lot.   For this reason, there is advantage

after the packing and shipping lines are completed

(emptied) for one lot, the next lot is incorporated in

25   terms of the fact that complicated lines are not needed and

in terms of the fact that the misprinting and packing error

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can be prevented.

By adding the number of the products to the designation information, a prescribed number of prints can be automatically performed. Moreover, if the destination is added to the designation information, a lot production of prescribed number of products can be made every destination. As for the designation information, while an operator registers the production number, lot number, and number of products in the designation information list 21 according to the production plan, for example, the number of the products may be individually registered to the process control apparatus 30.

In Fig. 5 the operating condition is included in the designation information for the purpose of synchronizing the switching operation in the control mode of the process control apparatus 30 with the whole of the system. The management of the switching operation of the process control apparatus 30 as described above avoids the complicated individual operations and makes it possible to initiate a lot unit of the printing in an ensured and simplified manner. It is noted that the operation condition represented from the designation information is any of "producing", "stopping", and "switching". The term "producing" means the situation where all the printers 40 execute printing, "switching" means the situation where part of plural printers complete the printing and are now

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under switching the next control mode, and the "stopping" means the situation where all the printers 40 have completed the printing and they are ready for switching the next control mode.

Again referring to Fig. 7, when the operation condition represented from the designation information is not "stopping" in each of the process control apparatuses 30, it is judged that all the lines have not yet been ready for switching. In this case, even if one process control apparatus 30 has completed a prescribed number of prints, this process control apparatus 30 awaits the switching to the next control mode until the operating condition indicates "stopping" (Step 106). Thereafter, the "stopping" is represented from the operating condition after several queries, the process control apparatus 30 acquires a prescribed control mode corresponding to the product number (Step S107), and the control through a prescribed printing data is initiated to switch lot (Step S108).

While the information designation system according to the present invention have been described by referring to the embodiment, it should be noted that the present invention is not restricted to such an embodiment, and various modifications and variants can be made without departing from the sprits and the scope of the present invention. For example, the process designation apparatus

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20 may also be configured to have the functions of the process control apparatus 30. Similarly, the process control apparatus 30 may also be configured to have the functions of the process execution apparatus like the printer 40. As just mentioned, each of the apparatuses constructing the system according to the present invention may be separated at a functional unit or some of the apparatus making up the system according to the present invention may be unified with each other.

Also, while the information designation system for printing process in the packing and shipping lines in cosmetic containers or food containers has been described in the embodiment of the present invention, the system according to the present invention is not restricted thereto, but is applicable to a wide range of fields. Particularly, the system according to the present invention is advantageously applicable to processes where the handling products are added or the installation is added a flexible manufacturing line.